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Discovering and Studying Near Earth Objects with The Large Synoptic Survey Telescope (LSST)

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ABSTRACT

The large synoptic survey telescope (LSST) will detect a remarkable number of small bodies throughout the solar system, with the capability to discover on the order of 100K Near Earth Objects (NEOs), 5.5M main belt asteroids, and 40K transNeptunian objects, with further discoveries of comets, mini-moons and irregular satellites. With its 9.6 square degree field of view (3.2 Gigapixel camera) and 6.5m effective diameter mirror [1], it is expected to discover about 60% of the NEO population with H<22, or about 70% of the population when combined with other ongoing surveys, a significant contribution toward planetary defense [2]. The LSST survey will continually image the sky for ten years in *ugrizy* filters, resulting in a rich dataset that will also be used for characterization studies. An H=20 NEO discovered by LSST is likely to receive a median of 114 observations over about 7 years; a smaller H=22 NEO is likely to be observed about 48 times over 4 years.

We will show the results of completeness estimates for various LSST survey strategy options, and discuss the ongoing survey strategy optimization process. While LSST will obtain multiple observations of objects within a night, the observations of each NEO will be relatively sparse in time and require using non-simultaneous photometric measurements to determine colors. We will present preliminary results of light curve and color determination simulated from LSST cadences.

[1] Ivezić, Ž., et. al., 2018, LSST: from Science Drivers to Reference Design and Anticipated Data Products. *arXiv:0805.2366.*

[2] Jones, R.L., Slater, C.T., Moeyens, J., Allen, L., Axelrod, T., Cook, K., Ivezić, Ž., Jurić, M., Myers, J. and Petry, C.E., 2018. The Large Synoptic Survey Telescope as a Near-Earth Object discovery machine. *Icarus*, *303*, pp.181-202.

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